CLAIMS

What is claimed is:

- 1. A method of identifying a compound useful for the treatment or prevention of neuropathic pain, comprising:
- (a) contacting a cell expressing P2X₄ receptor on the surface thereof, with a test compound, in the presence of P2X₄ receptor agonist,
- (b) determining whether or not said test compound inhibits an interaction of said P2X₄ receptor agonist and P2X₄ receptor on the surface of the cell, and
- (c) identifying the test compound which inhibits said interaction, as useful for the treatment or prevention of neuropathic pain.
- 2. The method according to claim 1, wherein the neuropathic pain is tactile allodynia induced after nerve injury.
- 3. The method according to claim 1, wherein the cell is mammalian cell.
- 4. The method according to claim 1, wherein the cell does not express any P2X receptors other than P2X₄ receptor.
- 5. The method according to claim 1, wherein the P2X₄ receptor agonist is ATP or ADP.
- 6. The method according to claim 1, wherein the contacting step (a) comprises incubating the cell and the test compound in the absence of the $P2X_4$ receptor agonist, and then incubating them in the presence of the $P2X_4$ receptor agonist.
- 7. The method according to claim 1, wherein the determining step (b) comprises measuring P2X₄ receptor-mediated ion flux of at least one ion selected from the group consisting of Na⁺, K⁺, and Ca²⁺.
- 8. The method according to claim 7, wherein the contacting step (a) is carried out in the presence of the ion.

- 9. The method according to claim 1, wherein the determining step (b) comprises comparing intensity of the interaction with that of control sample obtained in the absence of any test compounds.
- 10. A method of identifying a compound useful for the treatment or prevention of neuropathic pain, comprising:
- (a) contacting a microglia in inactive-form with a test compound, in the presence of microglia-activator,
- (b) determining whether or not said test compound inhibits an activation of said microglia, and
- (c) identifying the test compound which inhibits said activation, as useful for the treatment or prevention of neuropathic pain.
- 11. The method according to claim 10, wherein the neuropathic pain is tactile allodynia induced after nerve injury.
- 12. The method according to claim 10, wherein the microglia-activator is ATP or ADP.
- 13. The method according to claim 10, wherein the contacting step (a) comprises incubating the cell and the test compound in the absence of the microglia-activator, and then incubating them in the presence of the microglia-activator.
- 14. A pharmaceutical composition comprising a P2X₄ receptor inhibitor and a pharmaceutically acceptable carrier.
- 15. The pharmaceutical composition according to claim 14 for use in treatment or prevention of neuropathic pain.
- 16. The pharmaceutical composition according to claim 15, wherein the neuropathic pain is tactile allodynia induced after nerve injury.
- 17. The pharmaceutical composition according to claim 14, wherein the $P2X_4$ receptor inhibitor is a $P2X_4$ receptor antagonist.

- 18. The pharmaceutical composition according to claim 14, wherein the P2X₄ receptor inhibitor is an antibody or an antibody fragment which binds to P2X₄ receptor protein on the cell surface and prevents the interaction between the receptor and its agonist.
- 19. The pharmaceutical composition according to claim 14, wherein the $P2X_4$ receptor inhibitor is an antisense nucleic acid molecule that specifically suppresses expression of $P2X_4$ receptor gene.
- 20. The pharmaceutical composition according to claim 14, wherein the P2X₄ receptor inhibitor is an siRNA nucleic acid molecule that specifically suppresses expression of P2X₄ receptor gene.
- 21. The pharmaceutical composition according to claim 14, wherein the P2X₄ receptor inhibitor is a vector expressing an siRNA nucleic acid molecule that specifically suppresses expression of P2X₄ receptor gene.
- 22. A pharmaceutical composition comprising a microglial activation-inhibitor and a pharmaceutically acceptable carrier.
- 23. The pharmaceutical composition according to claim 22 for use in treatment or prevention of neuropathic pain.
- 24. The pharmaceutical composition according to claim 23, wherein the neuropathic pain is tactile allodynia induced after nerve injury.
- 25. The pharmaceutical composition according to claim 22, wherein the microglial activation-inhibitor is a P2Y₁₂ receptor inhibitor.
- 26. A method for treating or preventing neuropathic pain comprising administering to a subject a therapeutically effective amount of P2X₄ receptor inhibitor.
- 27. The method according to claim 26, wherein the neuropathic pain is tactile allodynia induced after nerve injury.

- 28. The method according to claim 26, wherein the P2X₄ receptor inhibitor is a P2X₄ receptor antagonist.
- 29. The method according to claim 26, wherein the P2X₄ receptor inhibitor is an antibody or an antibody fragment which binds to P2X₄ receptor protein on the cell surface and prevents the interaction between the receptor and its agonist.
- 30. The method according to claim 26, wherein the P2X₄ receptor inhibitor is an antisense nucleic acid molecule that specifically suppresses expression of P2X₄ receptor gene.
- 31. The method according to claim 26, wherein the P2X₄ receptor inhibitor is an siRNA nucleic acid molecule that specifically suppresses expression of P2X₄ receptor gene.
- 32. The method according to claim 26, wherein the $P2X_4$ receptor inhibitor is a vector expressing an siRNA nucleic acid molecule that specifically suppresses expression of $P2X_4$ receptor gene.
- 33. The method according to claim 26, wherein the P2X₄ receptor inhibitor is administered intraspinally.
- 34. The method according to claim 33, wherein the $P2X_4$ receptor inhibitor is administered by intrathecal injection.
- 35. The method according to claim 26, wherein the P2X₄ receptor inhibitor is administered in admixture with a pharmaceutically acceptable carrier.
- 36. A method for treating or preventing neuropathic pain comprising administering to a subject a therapeutically effective amount of microglial activation-inhibitor.
- 37. The method according to claim 36, wherein the neuropathic pain

is tactile allodynia induced after nerve injury.

- 38. The method according to claim 36, wherein the microglial activation-inhibitor is a $P2Y_{12}$ receptor inhibitor.
- 39. The method according to claim 36, wherein the microglial activation-inhibitor is administered intraspinally.
- 40. The method according to claim 39, wherein the microglial activation-inhibitor is administered by intrathecal injection.
- 41. The method according to claim 36, wherein the microglial activation-inhibitor is administered in admixture with a pharmaceutically acceptable carrier.